

Note upon the Longitudes of Madras, Singapore, and Batavia.

By Prof. J. A. C. Oudemans.

(Communicated by J. R. Hind, F.R.S.)

This summer I have at last received from Mr. Norman Pogson not only the necessary numbers for deducing the difference of longitude of Madras and Singapore, telegraphically determined by us in July 1871, but also the deduction of that longitude itself. My own calculation coincides wholly with his.

By proposing to Mr. Pogson the determination of the above-named difference of longitude, I intended to obtain a telegraphic longitude of Batavia as soon as the longitude of Madras should be telegraphically determined; the difference Batavia-Singapore having been determined already by me and Mr. Soeters half a year before.

I have now prepared a report on that determination, to be presented to the Dutch Colonial Government, and have sent a more detailed abstract of it to the editor of the *Astronomische Nachrichten*, so I will content myself with mentioning here only the result, viz. Singapore (flagstaff on Government Hill), east of Madras (Meridian Circle) $1^{\text{h}} 34^{\text{m}} 23^{\text{s}}.635$, and to add that the personal equation between Mr. Pogson and myself has not been determined, so that it remains in the result.

The longitude of Madras formerly adopted in the *Nautical Almanac* was $5^{\text{h}} 20^{\text{m}} 57^{\text{s}}.3$, but in that of 1882 it appears for the first time as $5^{\text{h}} 20^{\text{m}} 59^{\text{s}}.4$, the "Explanation" printed after the *Almanac* not explaining this change. As this number is less by $0'.25$ than that communicated by General Addison in the *Monthly Notices* of December 1877, I asked Mr. Hind for some information about the origin of the number in the *Nautical Almanac*. He most willingly answered me that the new longitude of Madras was communicated to him by Sir George Airy in a letter of 1878, January 25:—

			h	m	s
Transit of <i>Venus</i> .	}	Mokattam, East of Greenwich ...	2	5	6.320
		Suez, East of Mokattam ...	0	5	6.917
Indian Officers.	}	Aden, East of Suez ...	0	49	42.656
		Bombay, East of Aden ...	1	51	19.983
		Madras, East of Bombay ...	0	29	43.540
		Madras, East of Greenwich ...	5	20	59.416

and added, for further information, the following extract from Sir George Airy's letter:—

"Colonel Walker requests me to transmit to you for insertion (if you see no objection) in the *Nautical Almanac* the following determination of the longitude of Madras by telegraphic operations. The necessary observations were made by Captains W.

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M. Campbell and Heaviside, R.E. I do not answer for the accuracy (indeed, I have not all the observations), but I remark that care was taken to determine personal equations and to observe stars on both sides of the zenith; and I have no doubt on the general excellence of the work. The work of the Indian observers was based on that of the Transit of Venus."

Now, the "Account of Observations of the Transit of Venus, 1874, December 8, &c.," edited by Sir George Biddell Airy, 1881, gives the first two of the above-named differences respectively $0^s.08$ smaller and $0^s.013$ larger. Though I judged for myself that this result being printed and probably of a later date ought to be preferred, I took the liberty to consult Sir George himself, whose answer was affirmative. Thus, taking the differences Mokattam-Greenwich and Suez-Mokattam from the "Account, &c.," we have:—

				h	m	s
Mokattam, East of Greenwich	...	...	...	2	5	6.24
Suez, East of Mokattam	...	...	...	0	5	6.93
Aden, East of Suez	...	...	...	0	49	42.656
Bombay, East of Aden	...	...	...	1	51	19.983
Madras, East of Bombay	...	...	...	0	29	43.540
Singapore, East of Madras	...	...	...	1	34	23.365
Batavia, East of Singapore	...	...	...	0	11	50.985

whence, by addition, east of Greenwich:

				h	m	s
Madras (Meridian Circle)	...	...	...	5	20	59.349
Singapore (flagstaff on Government Hill)	...	...	...	6	55	22.714
Batavia (time signal)	...	...	...	7	7	13.70

The new longitude of Batavia exceeds only by $1^s.20$ the former one, determined by me in 1858, chiefly by occultations of stars.

At Singapore the Government kindly erected a brick pillar for our observations north of the cathedral; besides its latitude we determined the relative positions of this pillar, the spire of the cathedral, and the flagstaff on Government Hill. The result was:—

Pillar, east of flagstaff	...	...	...	21"	10 or 1.407	^s
Spire " "	...	...	...	18.48	or 1.232	
Latitude of flagstaff	1°	17' 34.4	North.
" spire	1	17' 32.8	"
" pillar	1	17' 39.8	"

Utrecht: 1882, Dec. 27.

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The Proper Motions of Telescopic Stars. By Professor Grant.

The work connected with the preparation of the Glasgow Star Catalogue has indicated the existence of several stars below the sixth magnitude having a considerable proper motion. It may be mentioned that the Catalogue contains 6415 stars, of which at least 5000 were taken for re-observation from the first volume of Weisse's Bessel. When the Glasgow results were finally worked out, it became an object of interest to institute a comparison between them and the corresponding results of the Catalogue from which they were originally derived. For this purpose the places in Weisse's Bessel were carefully brought up to 1870, the epoch of the Glasgow Catalogue, and the results in R.A. and N.P.D. of both Catalogues were then confronted together. In this way it was expected that any discordance in either or both of the co-ordinates, depending upon proper motion, would at once reveal itself. Although the agreement between the two Catalogues was on the whole very satisfactory, still a considerable number of discordances did present themselves, and the question now to be considered was whether those discordances were due to proper motion, or whether they were not in many instances attributable to errors of observation and reduction, arising from various sources. For this reason I made it a practice in every case of considerable discordance to search Lalande's *Histoire Céleste*, with the view of ascertaining whether the place of the star under consideration was also contained in that Catalogue. In this search I was generally successful; and if I found that the discordance of Bessel relatively to Glasgow was to the discordance of Lalande relatively to Glasgow, generally speaking, in the proportion of two to three, I concluded that I was really in the track of a proper motion. But to establish this point beyond doubt, it was necessary to ascertain the mean epochs of observation of Lalande and Bessel, an important element which is not contained either in the English edition of Lalande or in Weisse's Bessel. However, a reference to the *Histoire Céleste* and the volumes of the Königsberg Observations supplied me with the desired information. When I had finished the work of comparison, and ascertained beyond doubt the existence of several considerable proper motions in the Glasgow Catalogue, it occurred to me that it would be desirable to know whether the same, or nearly the same, results had been arrived at elsewhere. For this purpose I lately procured from the Library of the Society the seventh volume of the Bonn Observations, containing Argelander's remarkable list of proper motions, which I had not previously seen. Upon examination, I found that Nos. 14, 25, 30, 32, 33, 35, and 37 of the list here given had not escaped the lynx eye of the eminent astronomer of Bonn. I have also ascertained that No. 2 in the list is contained in the Melbourne Catalogue. Probably others in the list